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Declarative Agent Languages and Technologies X

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Revised Selected Papers



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Series Editors

Randy Goebel, University of Alberta, Edmonton, Canada
Jörg Siekmann, University of Saarland, Saarbrücken, Germany
Wolfgang Wahlster, DFKI and University of Saarland, Saarbrücken, Germany

Volume Editors

Matteo Baldoni
Università degli Studi di Torino, Dipartimento di Informatica
Via Pessinetto, 12, 10149 Torino, Italy
E-mail: baldoni@di.unito.it

Louise Dennis
University of Liverpool, Department of Computer Science
Ashton Building, Liverpool, L69 3 BX, UK
E-mail: l.a.dennis@liverpool.ac.uk

Viviana Mascardi
Università degli Studi di Genova, DIBRIS, Dipartimento di Informatica
Via Dodecaneso, 35, 16146, Genova, Italy
E-mail: viviana.mascardi@unige.it

Wamberto Vasconcelos
University of Aberdeen, Department of Computing Science
Meston Building, Aberdeen, AB24 3UE, UK
E-mail: w.w.vasconcelos@abdn.ac.uk

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Preface

The Workshop on Declarative Agent Languages and Technologies (DALT), in its tenth edition in 2012, is a well-established forum for researchers and practitioners interested in exploiting declarative approaches for tackling the great challenges that today's distributed applications raise. Current distributed systems are usually made up of highly autonomous components working in open, dynamic, and unpredictable environments. A large, useful, practical, and popular subcategory of such distributed systems includes software agents and multi-agent systems (MASs). Designing, developing, testing, and maintaining such systems calls for models and technologies that ensure predictability and allow for the verification of critical properties, while still maintaining flexibility. Rapid prototyping and knowledge representation and management are often important in the design and development of such systems. Declarative approaches have the potential to offer solutions that satisfy the needs arising when engineering systems as complex as MASs. For this reason, declarative approaches have gained more and more attention in important application areas such as the Semantic Web, service-oriented computing, security, and electronic contracting.

This volume presents the latest developments in the area of declarative languages and technologies, which aim to provide rigorous frameworks for engineering autonomous interacting agents. These frameworks are based on computational logics and other formal methods such as mathematical models and game theoretical approaches that facilitate the development of agents reasoning and acting rationally, and support the formal verification of the agents' behavior against their specification.

In the tradition of DALT, the 2012 meeting was held as a satellite workshop of the 11th International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS 2012), in Valencia, Spain. Following the success of DALT 2003 in Melbourne (LNAI 2990), DALT 2004 in New York (LNAI 3476), DALT 2005 in Utrecht (LNAI 3904), DALT 2006 in Hakodate (LNAI 4327), DALT 2007 in Honolulu (LNAI 4897), DALT 2008 in Estoril (LNAI 5397), DALT 2009 in Budapest (LNAI 5948), DALT 2010 in Toronto (LNAI 6619), and DALT 2011 in Taiwan (LNAI 7169), DALT 2012 was organized as a forum in which theoreticians and practitioners could meet for scientific exchange on declarative approaches for specifying, verifying, programming, and running software agents and MASs.

This volume contains 13 contributions: four are revised and extended versions of short papers accepted at AAMAS 2012; and the remaining nine papers are original contributions presented at DALT 2012, revised and extended in light of our reviewers' comments. All the full papers have been carefully reviewed to check their originality, quality, and technical soundness. The DALT 2012 workshop received eight regular submissions and three position papers. Six papers and three position papers were selected by the Program Committee and are

included in this volume. Each paper received at least three reviews. The position papers were an innovation introduced to celebrate DALT's 10th edition and the Alan Turing year. Each paper received two "light touch" reviews and was evaluated on the basis of its potential for stimulating discussion.

"Handling Change in Normative Specifications" by Duangtida Athakravi, Domenico Corapi, Alessandra Russo, Marina De Vos, Julian Padget, and Ken Satoh describes a (semi-)automated process for controlling the elaboration of normative specifications and demonstrates its effectiveness through a proof-of-concept case study. The methodology for elaborating normative specifications is based on use-cases to capture desirable and undesirable system behaviors, and inductive logic programming to justify why certain changes are better than others.

"Latest Developments of WADE to Support User-Centric Business Processes" by Federico Bergenti, Giovanni Caire, and Danilo Gotta presents the latest developments of WADE (Workflows and Agents Development Environment), aimed at enhancing its agent-based runtime platform by providing improved non-functional features and a better integration with the external software systems, and enabling the rapid and effective realization of user-centric business processes.

"Strong Planning in the Logics of Communication and Change" by Pere Pardo and Mehrnoosh Sadrzadeh discusses how to adapt backward plan search to the logics of communication and change (LCC). The proposed LCC planning system greatly expands the social complexity of scenarios involving cognitive agents that can be solved: for example, goals or plans may consist of a certain distribution of beliefs and ignorance among agents.

"Agent Deliberation via Forward and Backward Chaining in Linear Logic" by Luke Trodd, James Harland, and John Thangaraja explores how a BDI approach can be implemented in the Lygon logic programming language based on linear logic. The way backward and forward chaining techniques can be used to provide proactive and reactive agent behaviors is discussed, as well as extensions to Lygon to generate plans that achieve a given goal using abduction techniques, and to proactively check maintenance goals.

"Automatic Generation of Self-Monitoring MASs from Multiparty Global Session Types in Jason" by Davide Ancona, Sophia Drossopoulou, and Viviana Mascardi exploits global session types specifying multi-party interaction protocols to allow automatic generation of self-monitoring MASs. Such a generated MAS ensures that agents conform to the protocol at run-time, by adding a monitor agent that checks that the ongoing conversation is correct w.r.t. the global session type.

"A Generalized Commitment Machine for 2CL Protocols and Its Implementation" by Matteo Baldoni, Cristina Baroglio, Federico Capuzzimati, Elisa Marengo, and Viviana Patti proposes an operational semantics for the commitment protocol language 2CL. This semantics relies on an extension of Singh's Generalized Commitment Machine and has been implemented in Prolog by extending Winikoff, Liu, and Harland's implementation with a graphical tool that

allows the analyst to explore all the possible executions, showing both commitment and constraint violations.

“Solving Fuzzy Distributed CSPs: An Approach with Naming Games” by Stefano Bistarelli, Giorgio Gosti, and Francesco Santini focuses on solving both Fuzzy Naming Games and Fuzzy Distributed Constraint Satisfaction Problems (DCSPs) with an algorithm inspired by Naming Games. With respect to classical Fuzzy DCSPs, the proposed system can react to small instance changes, and the algorithm does not require a pre-agreed agent/variable ordering.

“Commitment Protocol Generation” by Akin Gunay, Michael Winikoff, and Pinar Yolum faces the problem of generating commitment protocols on the fly to interact with other agents when no predefined protocols are available. The generation algorithm considers the agent’s own goals and capabilities as well as its beliefs about other agents’ goals and capabilities, in order to generate commitments that are more likely to be accepted by other agents.

“Goal-Based Qualitative Preference Systems” by Wietske Visser, Koen Hindriks, and Catholijn Jonker shows that qualitative preference systems (QPSs) provide a general, flexible, and succinct way to represent preferences based on goals. If the domain is not Boolean, preferences are often based on orderings on the possible values of variables. The paper shows that QPSs based on such multi-valued criteria can be translated into equivalent goal-based QPSs that are just as succinct, and that goal-based QPSs allow for more fine-grained updates than their multi-valued counterparts.

“SAT-Based BMC for Deontic Metric Temporal Logic and Deontic Interleaved Interpreted Systems” by Bożena Woźna-Szcześniak and Andrzej Zbrzezny considers MASs modeled by deontic interleaved interpreted systems and provides a new SAT-based bounded model checking (BMC) method for these systems. The properties of MASs are expressed by means of the metric temporal logic with discrete semantics and extended to include epistemic and deontic operators.

“Some Thoughts About Commitment Protocols (Position Paper)” by Matteo Baldoni and Cristina Baroglio deals with commitment protocols and, after more than ten years from their introduction, look at whether a “commitment to do something” is the only kind of regulative norm that we need in order to give social semantics to a physical action, and if commitment protocols realize what they promised.

“Semantic Web and Declarative Agent Languages and Technologies: Current and Future Trends” (Position Paper) by Viviana Mascardi, James Hendler, and Laura Papaleo reviews the state of the art in the integration of Semantic Web concepts in declarative agent languages and technologies and outlines what the authors expect the future trends of this research topic to be.

“Designing and Implementing a Framework for BDI-Style Communicating Agents in Haskell” (Position Paper) by Riccardo Traverso and Alessandro Solimando presents the design and prototypical implementation of a framework for BDI-style agents defined as Haskell functions, supporting both the explicit representation of beliefs and backtracking (at the level of individual agents), and asynchronous communication via message passing.

Given the exciting discussion carried out during the workshop and the high quality of the papers collected in this volume, the DALT 2012 organizers would like to thank all authors for their contributions, the members of the Steering Committee for the valuable suggestions and support, and the members of the Program Committee for their excellent work during the reviewing phase

January 2013

Matteo Baldoni
Louise Dennis
Viviana Mascardi
Wamberto Vasconcelos

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Viviana Mascardi	University of Genova, Italy
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Additional Reviewers

Michal Cap	Czech Technical University in Prague, Czech Republic
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